EPA United States Environmental Protection Agency

EPA Tools and Resources Webinar: Data Management Tools for Emergency Response

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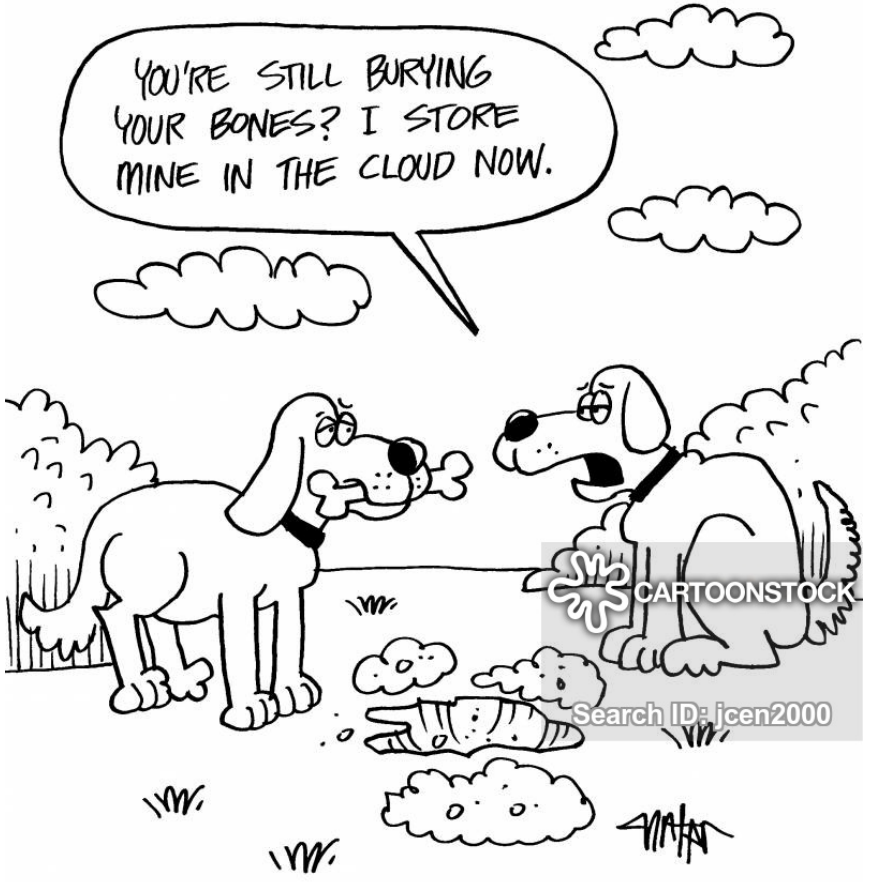
Thursday, August 10th, 2023

Presentation Outline

- Data management basics
- Application to contamination incidents
- Technologies and best practices
- Case study
- Parting thoughts



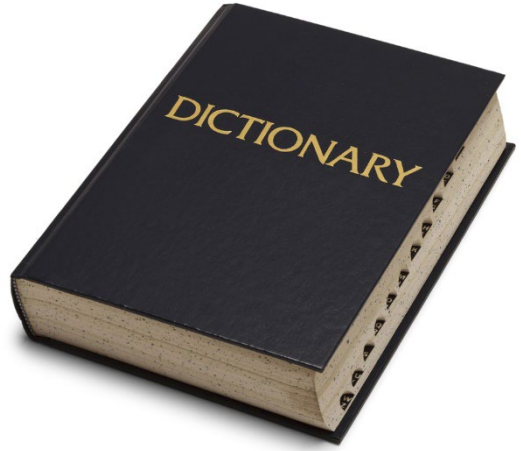
Data Management - The Basics

- **Data** - Data are facts and statistics collected for reference or analysis, representing the qualitative or quantitative attributes of a variable or set of variables.

- **Data Management** - practice of collecting, storing, and using data

- **Data Management Plan**: standard methods for data collection, management, reporting, and visualization practices

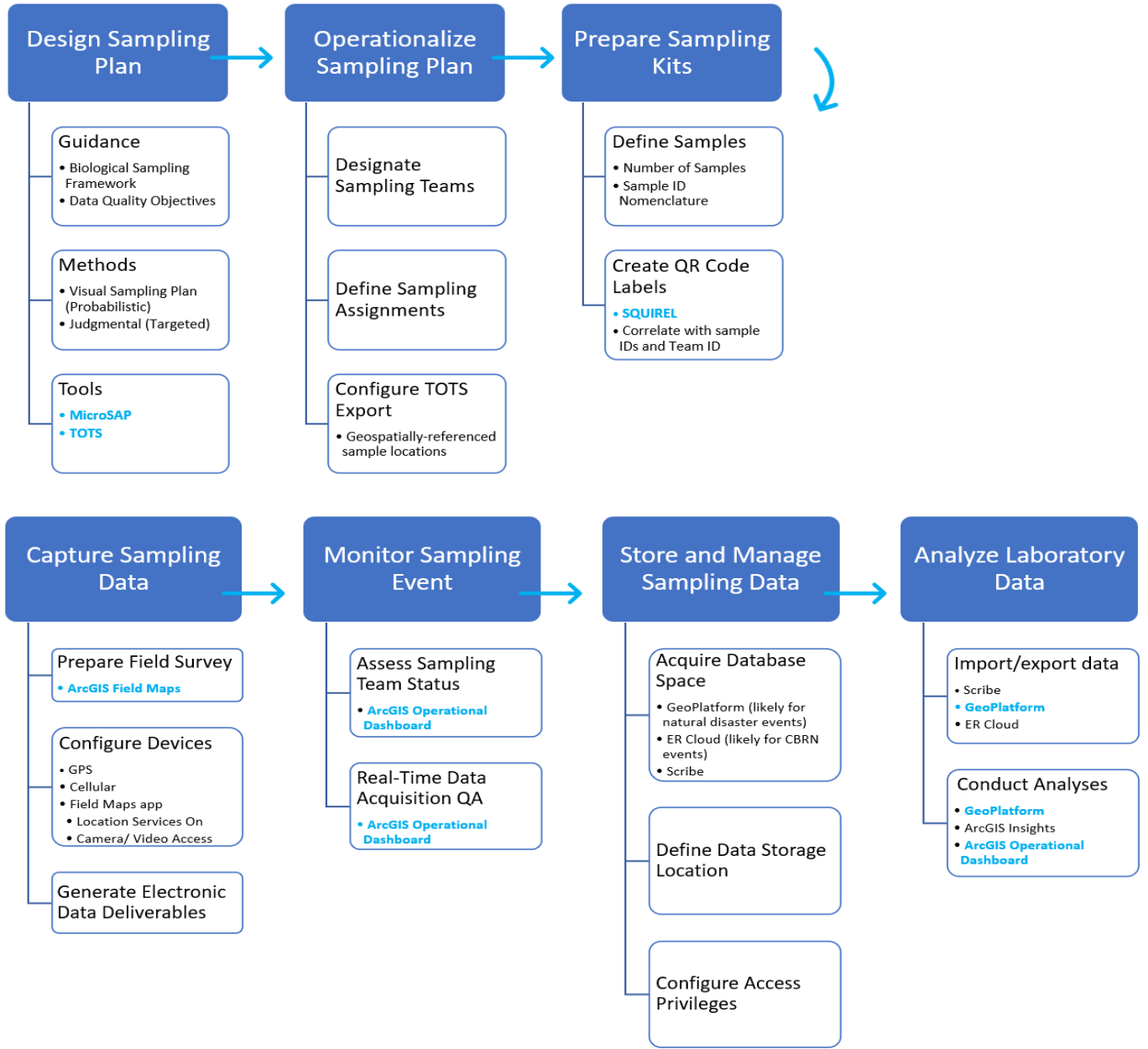
- **Data Management & Environmental Sampling:** data management plays a crucial role in environmental sampling as it ensures the quality and integrity of data collected from the environment.



CBR & Data Management

- Chemical, Biological, or Radiological (CBR) incidents can introduce many challenges when managing data
- A substantial amount of data will need to be collected, checked for quality, and maintained in order to support decision-making
- Depending on the size and scope of the incident, such an undertaking could continue for many years or decades
- Types of data collected during a CBR response could include:
  - Sample location
  - Sample matrix
  - Sampling method
  - Time and date of sample collection
  - Picture or video evidence
  - Sample collection personnel or team,
  - Laboratory processing the analysis,
  - Analysis results,
  - Mapping data (e.g., Global Positioning Systems [GPS], light detection and ranging [LiDAR], photogrammetry),
  - Documentation of quality assurance activities, and
  - Decontamination method

Sample Planning/Data Management



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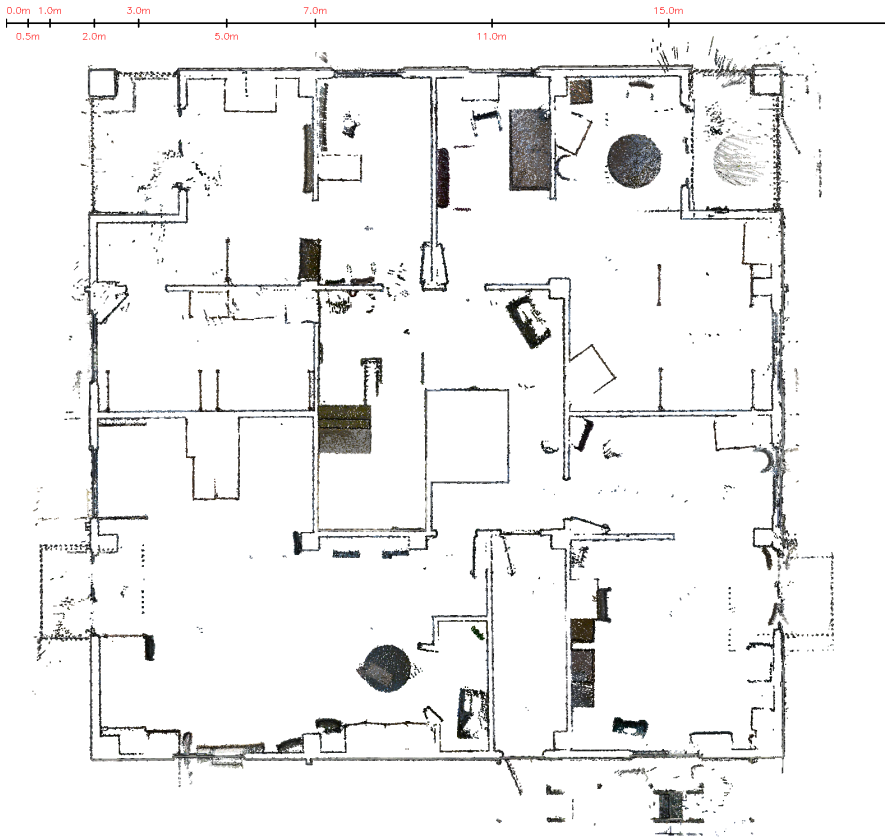
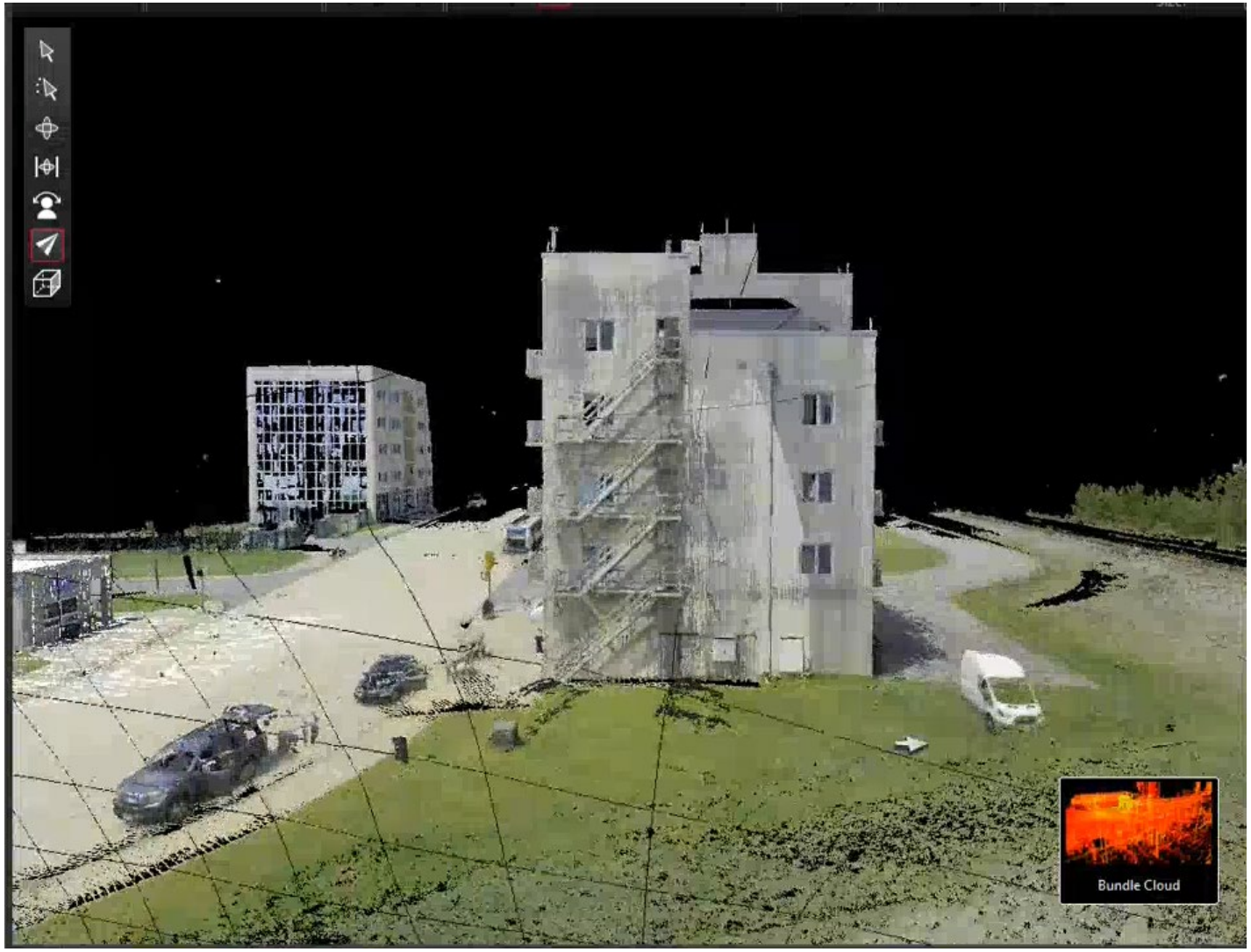
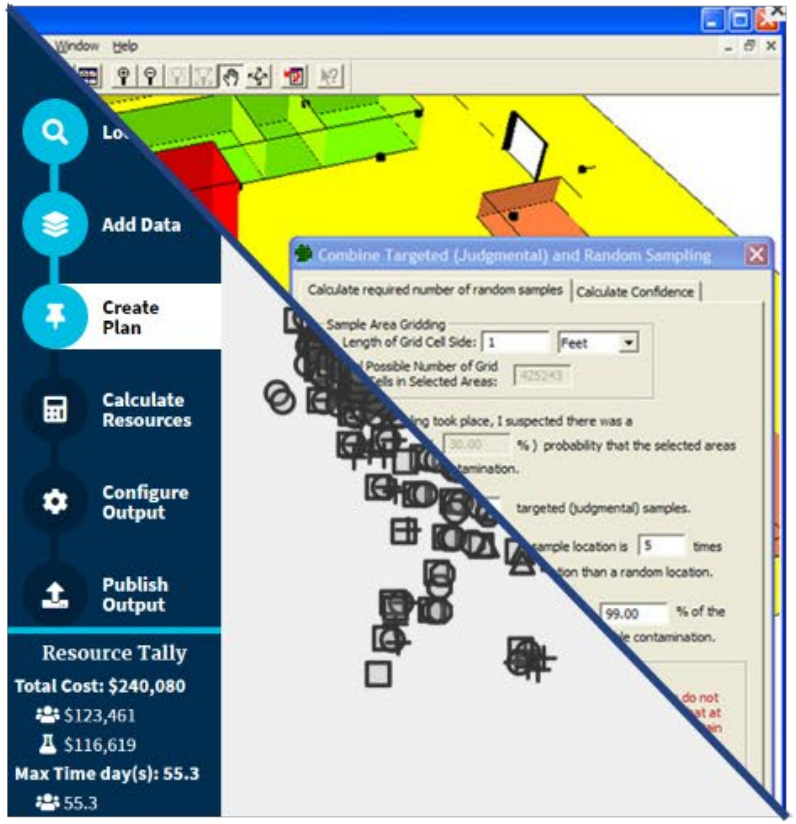
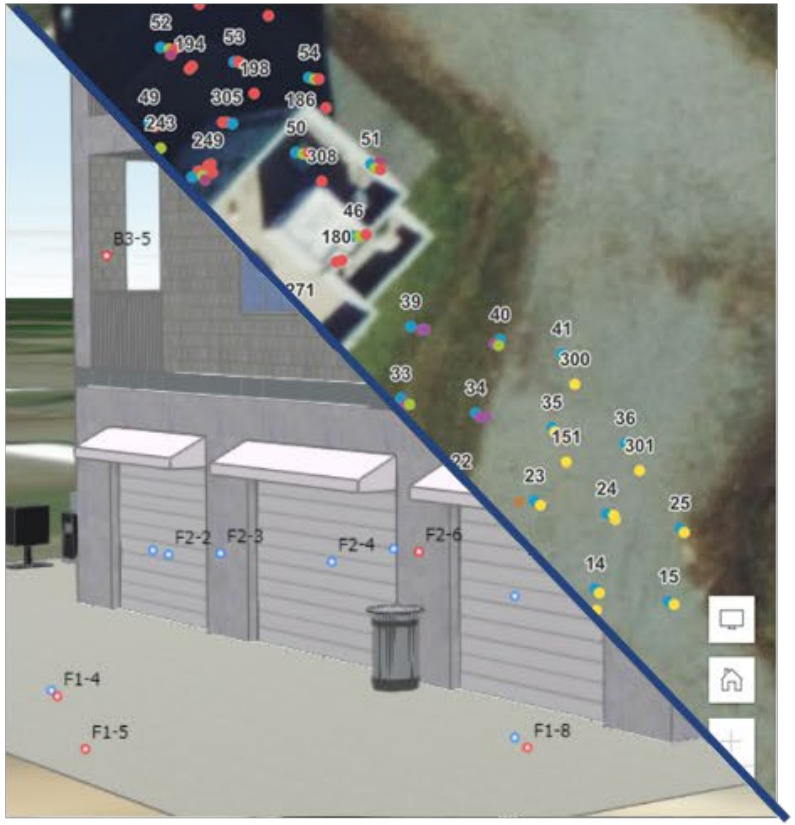
Site Mapping (Recon)

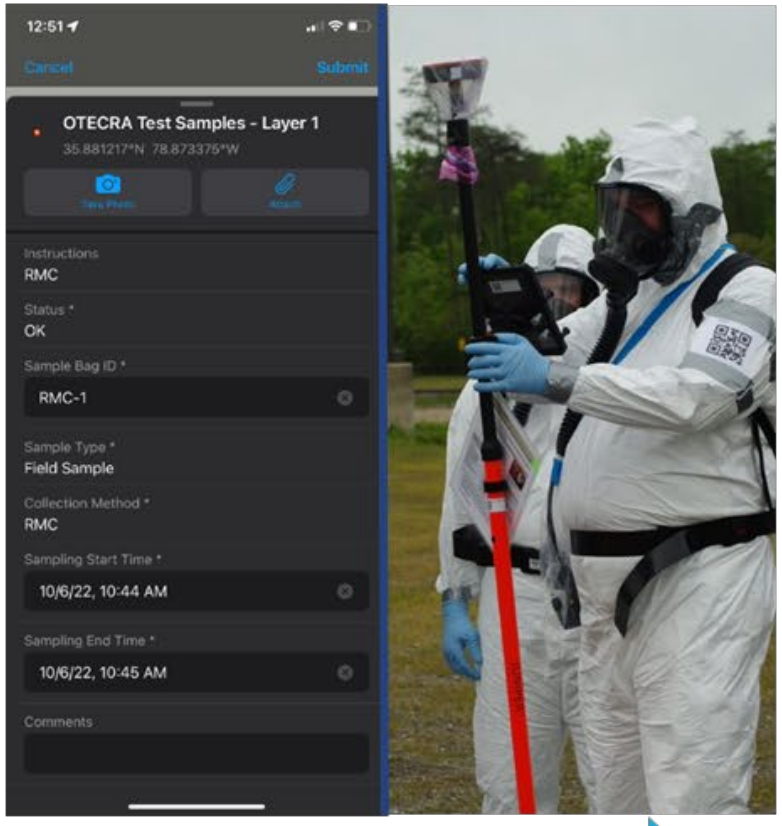




Sample Plan Design





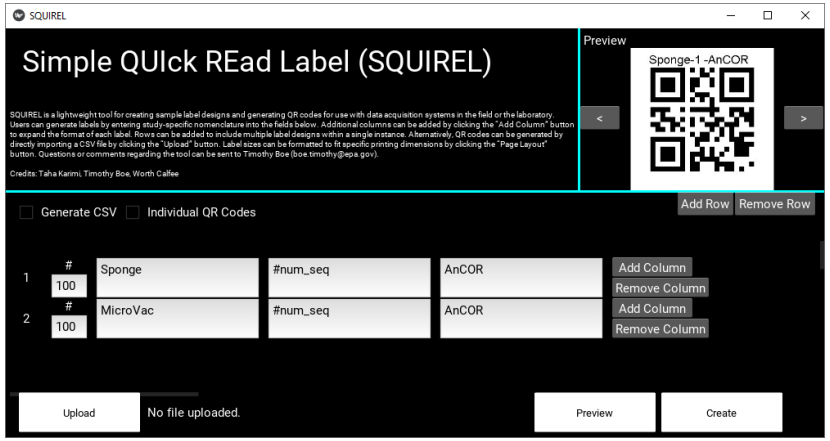


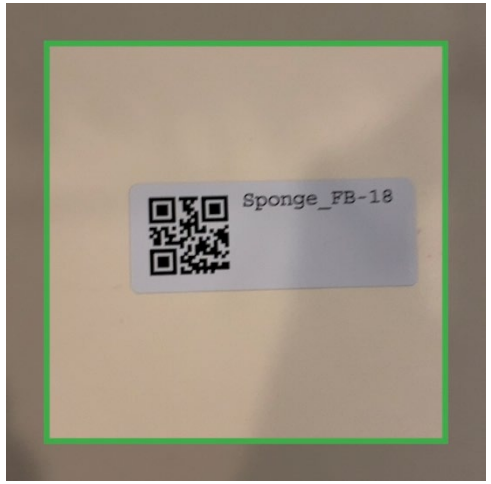
Determine Sampling Goals & Cost/Time Feasibility
Trade-off Tool for Sampling/Visual Sampling Plan

Define Data Fields & Validate Spatial Data
ArcPro, *ESRI Cloud*

Operationalize Sampling Plan & Capture Sampling Data
Survey123, Field Maps, *ESRI Cloud*

Sample Kit Preparation: Simple QUIck REad Label (SQUIREL)





Create Naming Scheme Per Total Number of Samples

Export to PDF & Print to Labels

Scan QR Code

Hardware Deployment & Management

GPS Bin

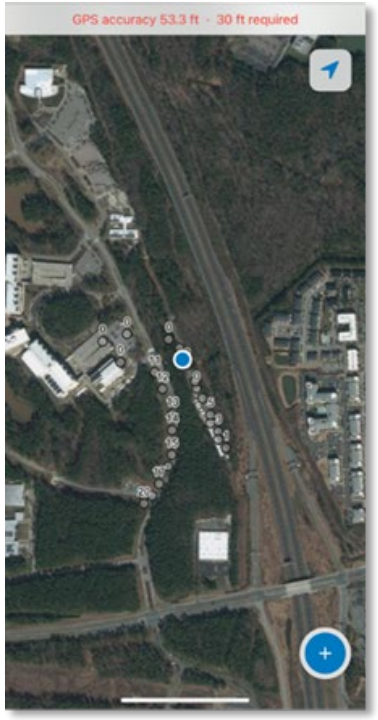
Tablet Setup and Charging Station

Monitoring Station

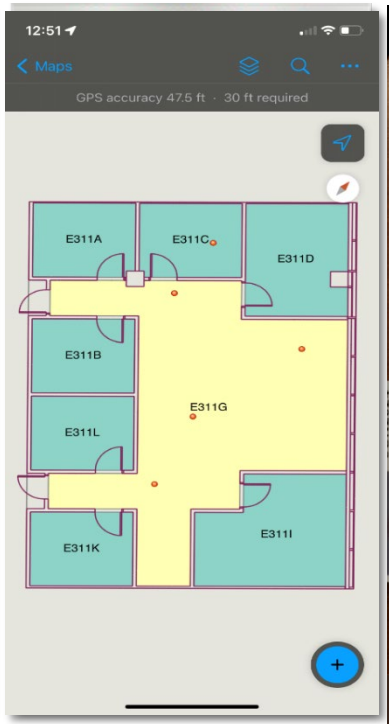
Data Management Station

Data Acquisition

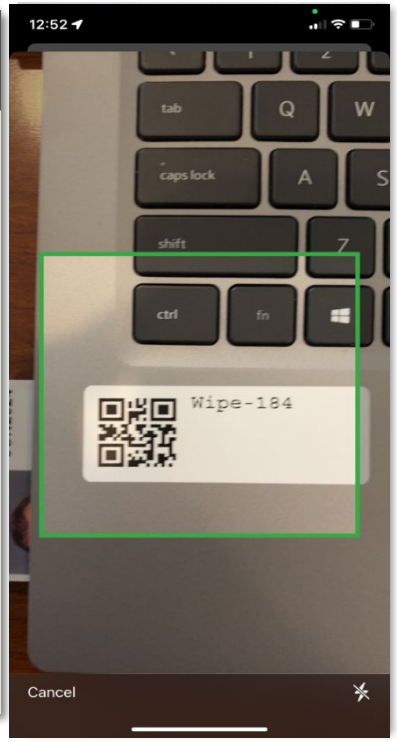
Sequencing



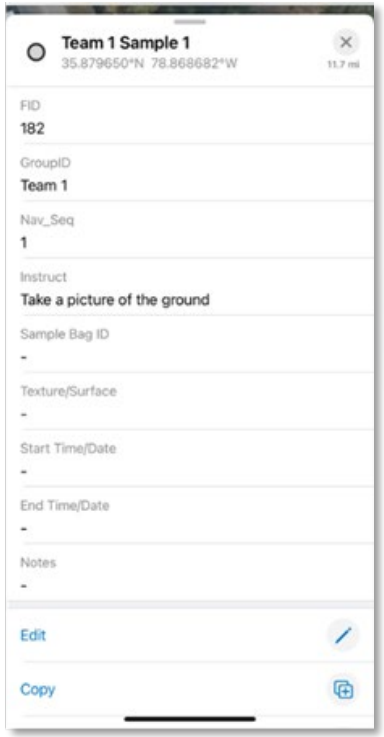
Navigation



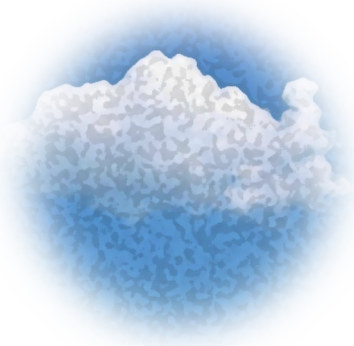
Data Entry



Error Checking



The Cloud



Monitoring Sample Event

39 of 40

Most Recent Picture

89

Last update: 5 seconds ago

Collected Samples

- Team 7 - Sample 68
  WetVac-19 - 11/4/2022, 9:59:23 AM
- Team 6 - Sample 45
  WetVac-18 - 11/4/2022, 10:01:40 AM
- Team 7 - Sample 135
  WetVac_FB-10 - 11/4/2022, 9:56:03 AM
- Team 6 - Sample 47
  Wipe-146 - 11/4/2022, 9:56:55 AM
- Team 8 - Sample 100
  WetVac-20 - 11/4/2022, 9:49:43 AM
- Team 6 - Sample 49
  Wipe-133 - 11/4/2022, 9:54:00 AM

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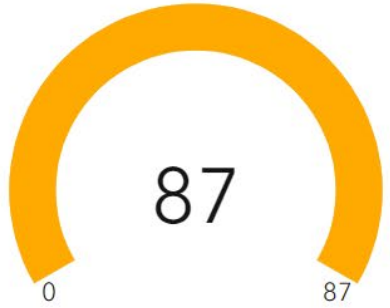
Pre-Decon



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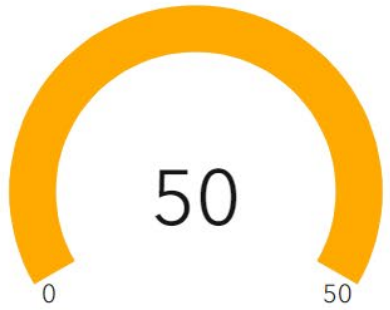
Post-Decon



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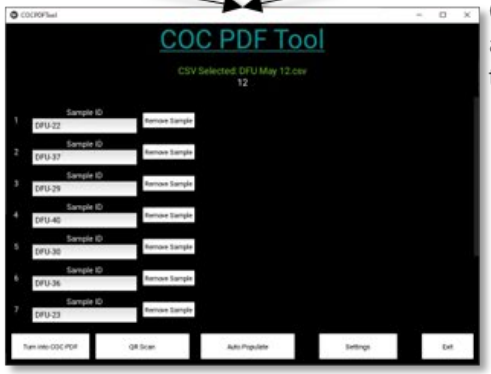
Chain of Custody

Launch COC PDF Tool, fill out site details, and select sample csv

Select mode for adding individual samples

Select lab then open camera for QR Scanner

Select lab then fill out details for samples to auto-populate into tool

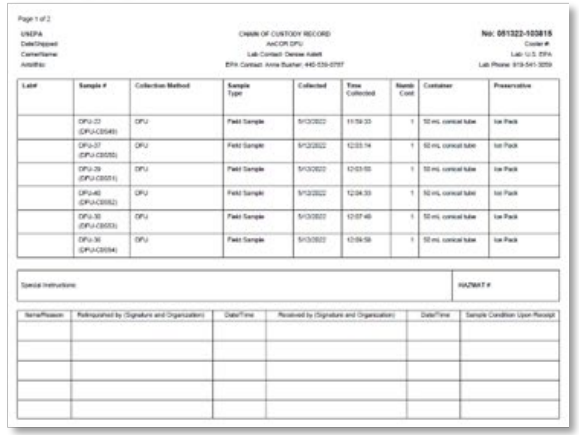


The tool recalls which samples have been used, ensuring they can't be scanned or auto-populated again

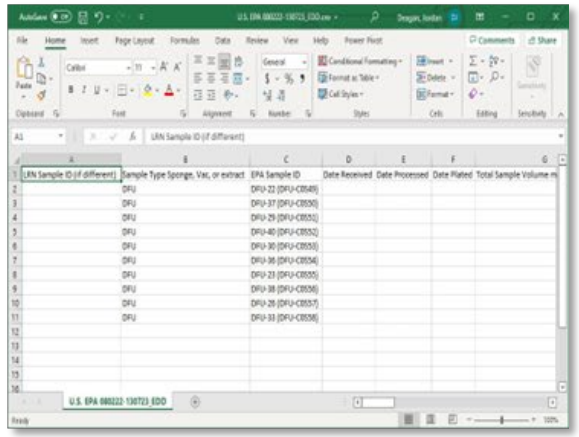
Once all samples are added, generate the forms

Results:

COC PDF



EDD CSV



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Case Study:

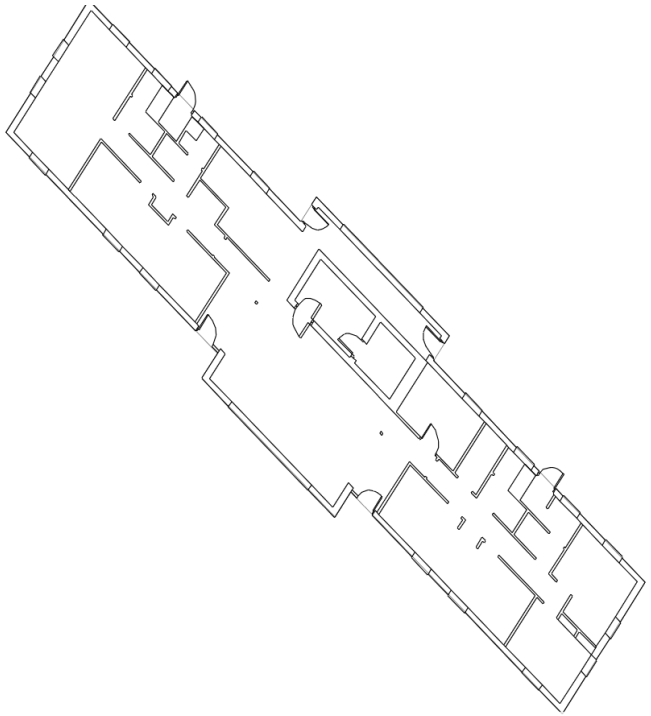
Operational Testing and Evaluation of Chemical Remediation Activities (OTECRA)

Operational Testing and Evaluation of Chemical Remediation Activities (OTECRA)

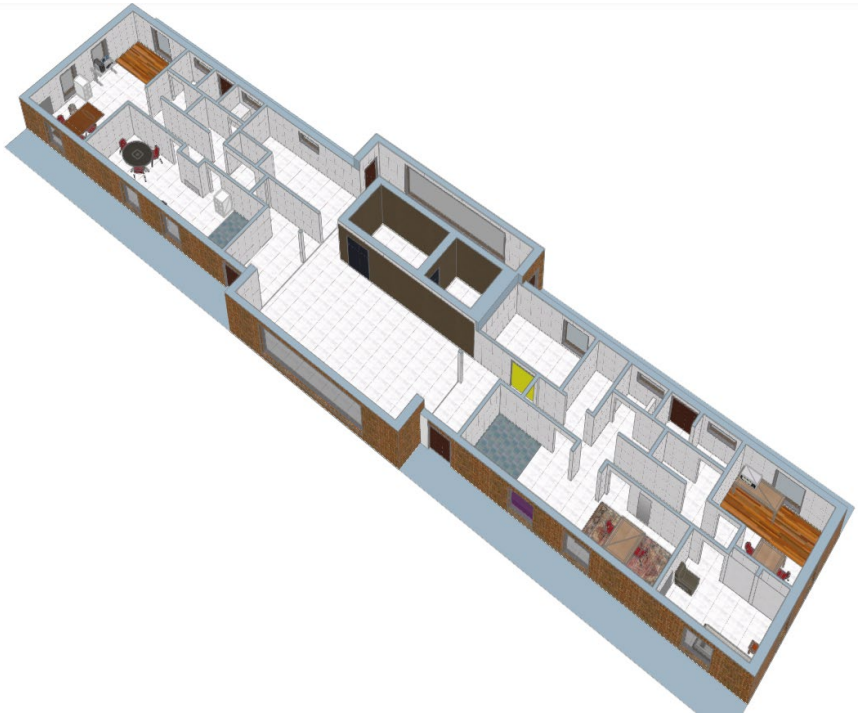
OTECRA is a full-scale exercise conducted by CMAD, CESER and the EPA Regions to evaluate the operational effectiveness of sampling and analytical methods and decontamination approaches in an indoor facility following the release of a highly toxic and persistent chemical warfare agent.

- Malathion used as simulant for persistent nerve agent (VX)
- Test newly developed chemical sampling and analysis methods, such as a wet vacuum sampler
- Assess decontamination technologies at the full-scale
- Test the use of QR codes to manage samples and to streamline data management and chain of custody, following samples through decon line to field or off-site laboratories

OTECRA: Sample Design



Convert CAD to GIS friendly format; project to coordinate system

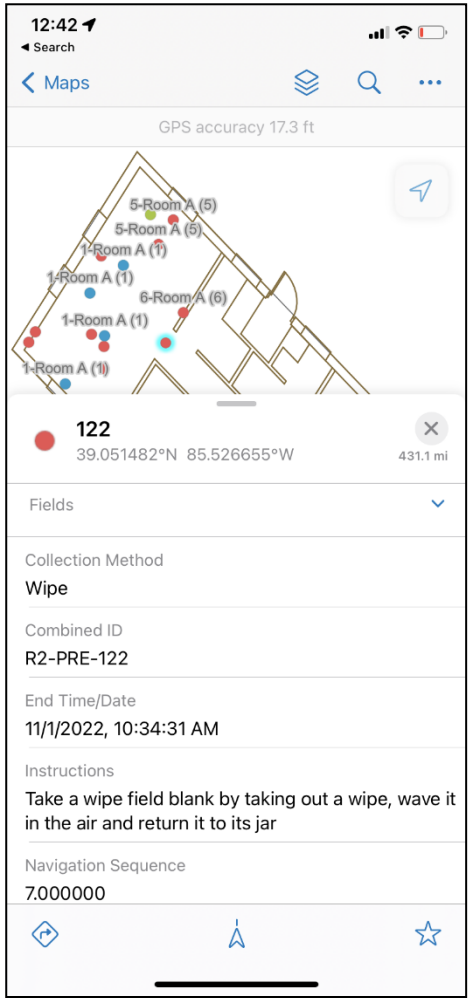


Extrude map to 3D form; add textures, content

Transition to web-based platform; use for interactive planning

OTECRA: Data Design

OBJECTID	Shape	Sample	Team	Combined	Room	Instructions	Collection Me	Sample T	Targeted Su
1	Point ZM	1	1	R2-PRE-1	Room A	Take a 12x12-in wipe sample on the drywall; use red tape as a guide - top le	Wipe	Field Sample	Painted drywall
2	Point ZM	2	5	R2-POST-2	Room A	Take a 12x12-in wipe sample on the drywall; use black tape as a guide; bott	Wipe	Field Sample	Painted drywall
3	Point ZM	3	5	R2-POST-3	Room A	Take a 12x12-in wipe sample on the drywall; use black tape as a guide; top-	Wipe	Field Sample	Painted drywall
4	Point ZM	4	1	R2-PRE-4	Room A	Take a 12x12-in wipe sample on the drywall; use red tape as a guide - botto	Wipe	Field Sample	Painted drywall
5	Point ZM	5	1	R2-PRE-5	Room A	Take a 12x12-in wipe sample on the mirror; use red tape as a guide	Wipe	Field Sample	Glass/Mirror
6	Point ZM	6	5	R2-POST-6	Room A	Take a 12x12-in wipe sample on the mirror; use black tape as a guide	Wipe	Field Sample	Glass/Mirror
7	Point ZM	7	1	R2-PRE-7	Room A	Take a 12x12-in wipe sample on the table; use red tape as a guide	Wipe	Field Sample	Table
8	Point ZM	8	1	R2-PRE-8	Room A	Take a 12x12-in wipe sample on the table; outside the marked areas	Wipe	Field Sample	Table
9	Point ZM	9	5	R2-POST-9	Room A	Take a 12x12-in wipe sample on the table; use black tape as a guide	Wipe	Field Sample	Table
10	Point ZM	10	5	R2-POST-10	Room A	Take a 12x12-in wipe sample on the table; outside a marked area	Wipe	Field Sample	Table
11	Point ZM	11	1	R2-PRE-11	Room A	Take a 12x12-in wipe sample on the seat of the chair; use red tape as a guic	Wipe	Field Sample	Chair seat
12	Point ZM	12	5	R2-POST-12	Room A	Take a 12x12-in wipe sample on the seat of the chair; use black tape as a g	Wipe	Field Sample	Chair seat
13	Point ZM	13	1	R2-PRE-13	Room A	Take a wipe sample (vertical) on the right side of the PC case; wipe whole ri	Wipe	Field Sample	PC Case
14	Point ZM	14	5	R2-POST-14	Room A	Take a wipe sample (vertical) on the left side of the PC case; wipe whole left	Wipe	Field Sample	PC Case
15	Point ZM	15	5	R2-POST-15	Room A	Take a 3x3-feet wet vacuum sample on the floor; use the black tape tape a	Wet-Vac	Field Sample	Flooring element
16	Point ZM	16	1	R2-PRE-16	Room A	Take a 3x3-feet wet vacuum sample on the floor; use the red tape tape as a	Wet-Vac	Field Sample	Flooring element
17	Point ZM	17	5	R2-POST-17	Room A	Take a 12x12-in wipe sample on the floor; use the black tape tape as a guid	Wipe	Field Sample	Flooring element
18	Point ZM	18	1	R2-PRE-18	Room A	Take a 12x12-in wipe sample on the floor; use the red tape tape as a guide	Wipe	Field Sample	Flooring element
19	Point ZM	19	5	R2-POST-19	Room A	Take a 12x12-in wipe sample on the floor; outside the marked areas in the fr	Wipe	Field Sample	Flooring element
20	Point ZM	20	1	R2-PRE-20	Room A	Take a 12x12-in wipe sample on the floor; outside the marked areas in the fr	Wipe	Field Sample	Flooring element
21	Point ZM	21	0	R2-PRE-21	Room A	Pick up the RMC from tile floor in front of PC desk using a clean forceps. Pla	RMC	Field Sample	RMC



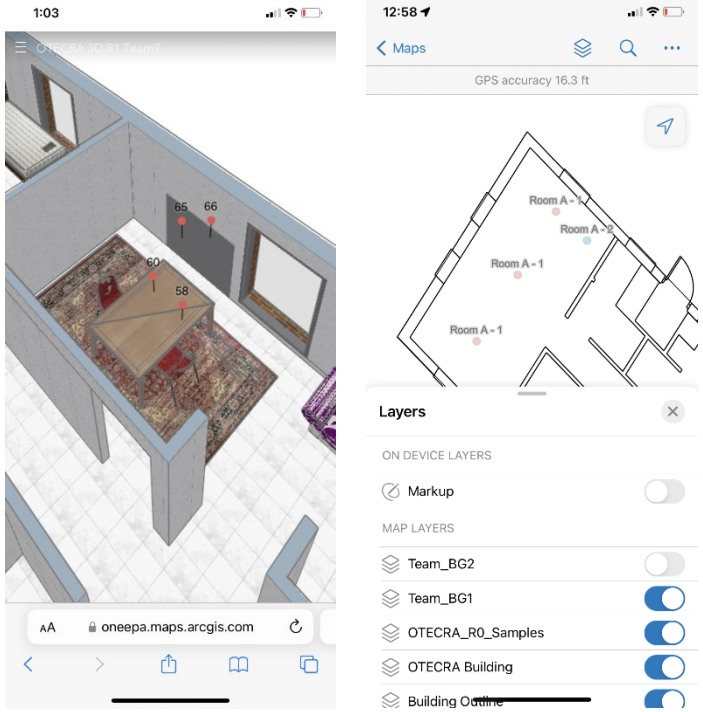
Enable 2D web-map version for data acquisition compatibility

Extrapolate attribute fields for “data refinement”; rejoin data

Stand-up sampling form; code fields; duplicate form as needed

OTECRA: Operations

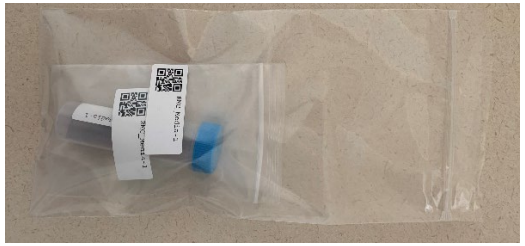
Established mobile data unit; provided network connectivity



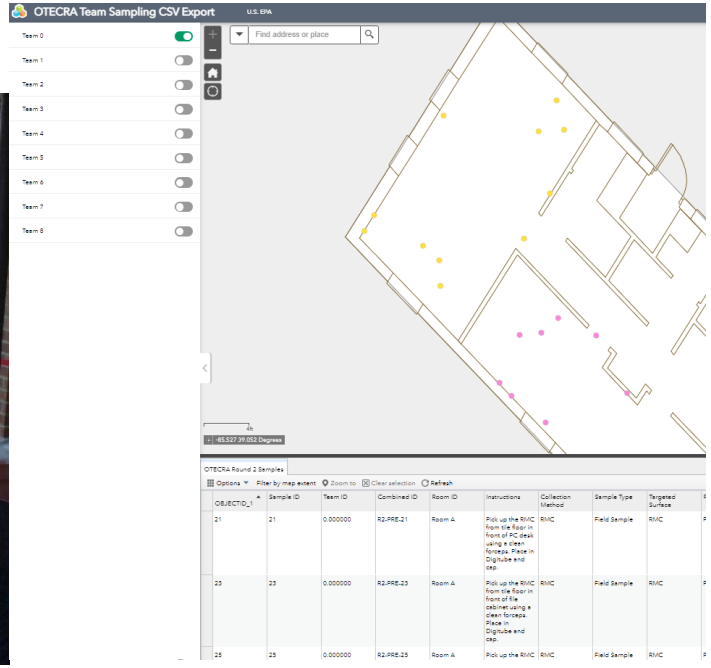
Mobile 3D map and sampling form used to support navigation and data entry

Status of collection efforts monitored using dashboard

OTECRA: Operations

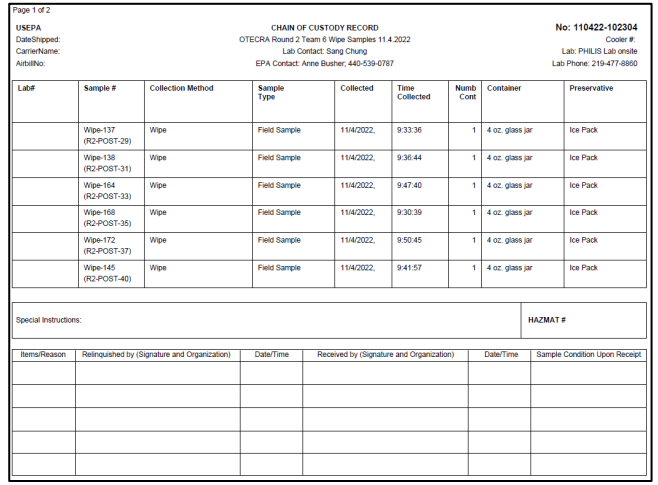


Samples undergo decon at egress; accountability checks;



Scan QR code or export by team ID; convert to CSV format

Samp_No	Lab_Locat	Matrix_ID	Sample_T	Lab_Coc_	Date_Coll	Date_Rec	Date_Extr	Date_Ana	Lab_Name	Lab_Samp	Lab_Batch	Analysis	Analyt
Wipe-137	PHILIS Lab onsite				11/4/2022, 9:33:36				PHILIS Lab onsite				
Wipe-138	PHILIS Lab onsite				11/4/2022, 9:36:44				PHILIS Lab onsite				
Wipe-164	PHILIS Lab onsite				11/4/2022, 9:47:40				PHILIS Lab onsite				
Wipe-168	PHILIS Lab onsite				11/4/2022, 9:30:39				PHILIS Lab onsite				
Wipe-172	PHILIS Lab onsite				11/4/2022, 9:50:45				PHILIS Lab onsite				
Wipe-145	PHILIS Lab onsite				11/4/2022, 9:41:57				PHILIS Lab onsite				
Wipe-165	PHILIS Lab onsite				11/4/2022, 9:39:13				PHILIS Lab onsite				
Wipe-136	PHILIS Lab onsite				11/4/2022, 9:45:00				PHILIS Lab onsite				
Wipe-146	PHILIS Lab onsite				11/4/2022, 9:56:55				PHILIS Lab onsite				
Wipe-133	PHILIS Lab onsite				11/4/2022, 9:54:00				PHILIS Lab onsite				
Wipe_FB-	PHILIS Lab onsite				11/4/2022, 9:28:35				PHILIS Lab onsite				



CHAIN OF CUSTODY RECORD

No: 110422-102304

Lab#	Sample #	Collection Method	Sample Type	Collected	Time Collected	Numb Cont	Container	Preservative
	Wipe-137 (R2-POST-29)	Wipe	Field Sample	11/4/2022,	9:33:36	1	4 oz. glass jar	Ice Pack
	Wipe-138 (R2-POST-31)	Wipe	Field Sample	11/4/2022,	9:36:44	1	4 oz. glass jar	Ice Pack
	Wipe-164 (R2-POST-33)	Wipe	Field Sample	11/4/2022,	9:47:40	1	4 oz. glass jar	Ice Pack
	Wipe-168 (R2-POST-35)	Wipe	Field Sample	11/4/2022,	9:30:39	1	4 oz. glass jar	Ice Pack
	Wipe-172 (R2-POST-37)	Wipe	Field Sample	11/4/2022,	9:50:45	1	4 oz. glass jar	Ice Pack
	Wipe-145 (R2-POST-40)	Wipe	Field Sample	11/4/2022,	9:41:57	1	4 oz. glass jar	Ice Pack

Generate EDD and COC form; using COC form

Sample Transfer

- Onsite presence of PHILIS led to transfer of WIPE samples in cooler (one cooler per team / ~ 12 samples; no lock used) to the sample processing room (SPR) for immediate processing
- Content of cooler was verified against CoC before hand delivery to PHILIS
- Back at the decon line: Cooler with LIQUID samples was kept under lock (zip tie) and unlocked/locked each time a set of samples was added
- Cooler was taken to SPR. Content of cooler was verified against CoC before storage in refrigerator and (later) shipment to external laboratory

Conclusion

- Data management goes beyond record keeping
- Plan/implement left of the “boom”
- Share examples, experiences, & solutions
- Contamination incidents (especially CBRN) complicate the data management process
- Research and technology are constantly evolving
- Guidance documents, frameworks, & tools are your friends

Contact

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